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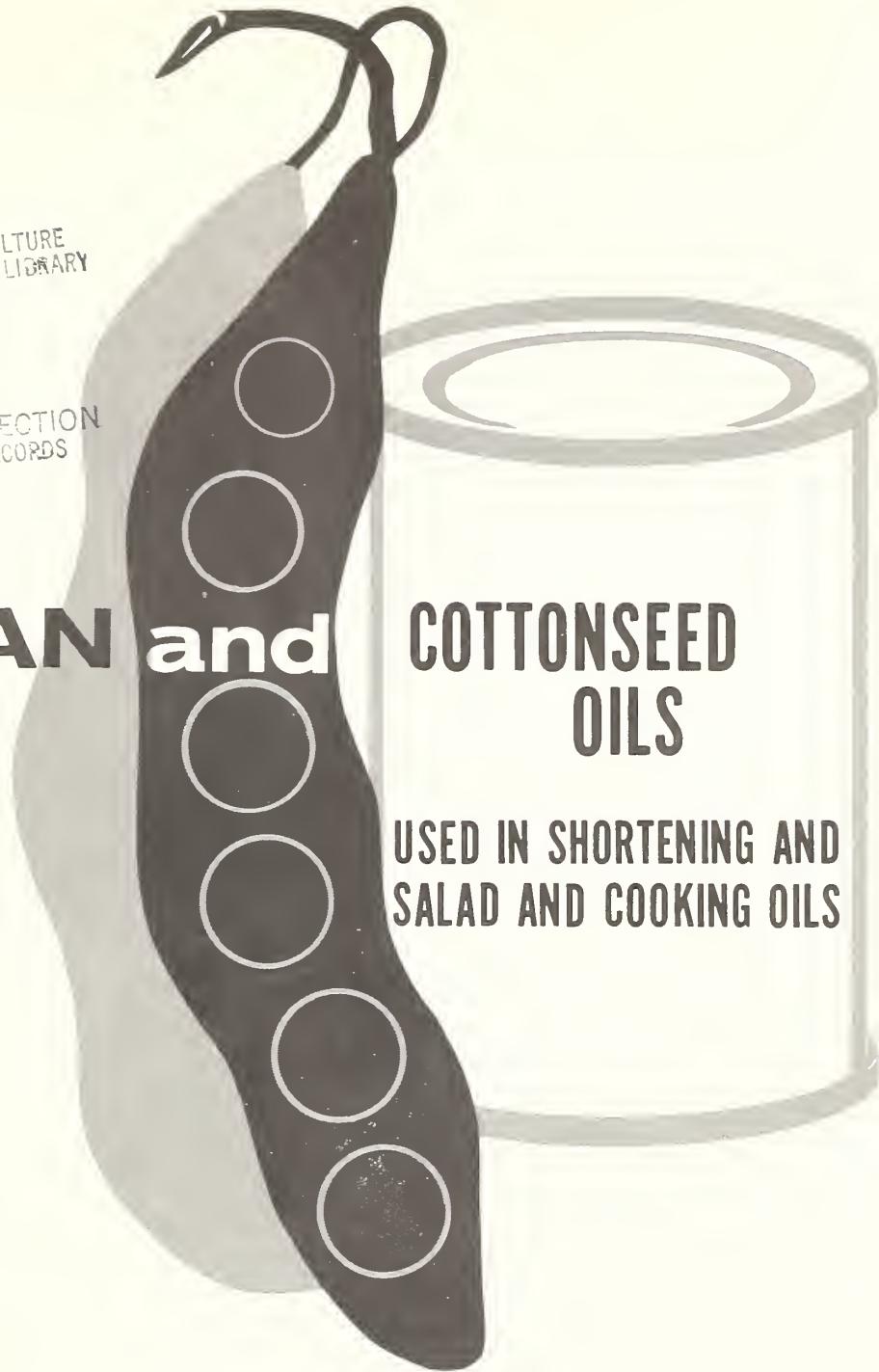
JUN 19 1972

PROCUREMENT SECTION
CURRENT SERIAL RECORDS

SOYBEAN and

COTTONSEED OILS

USED IN SHORTENING AND
SALAD AND COOKING OILS



- TRENDS
- PRICES
- SPREADS

U.S. DEPARTMENT OF AGRICULTURE•ECONOMIC RESEARCH SERVICE
MARKETING RESEARCH REPORT NO. 898

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ABSTRACT

Farm-to-retail price spreads are reported for a 3-pound grocery pack of shortening during 1947-68 and for a 24-ounce pack of salad or cooking oil during 1964-68. Retail prices for major and minor brands are evaluated, as are types of retail outlet in six U.S. areas. Farm-retail spreads have widened in the last 20 years; most of the increase has been for costs of services, since the farm value of the oils does not reflect strong change. Striking price differences appear between advertised and unadvertised brands and among the different types of retail outlets.

Key Words: Price spreads, soybean oils, cottonseed oils, shortening, salad and cooking oils, retail stores, advertising.

PREFACE

A major shift--from solid shortening to oils--in the utilization of various types of fats and oils in recent years created considerable marketing problems for agencies assembling, processing, and distributing shortening and salad and cooking oils. The objectives of this study were: to determine marketing margins covering payments for services provided by marketing agencies in transforming soybean, cottonseed, and other vegetable oils into shortening and salad or cooking oils, and distributing these commodities to consumers; to ascertain margins associated with major and minor brands of solid shortening and retail outlets by six different area locations; and to evaluate farm-to-retail price spreads for shortening and salad and cooking oils.

This study is one of several on important food products undertaken by the Economic Research Service. Congress has specified that certain marketing research funds be utilized for studies of marketing spreads, reflecting the widely held interest in farm-to-retail spreads.

The author wishes to extend special thanks to Harry O. Doty, Jr., Amos D. Jones, William A. Faught, Loyd C. Martin, George W. Kromer, and Henry T. Badger, ERS, for their assistance in overall planning and preparation of this report.

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SUMMARY

Soybean oil accounted for more than half of all fat ingredients in shortening in 1968, almost two-thirds of ingredients in salad and cooking oils, and more than two-thirds of all vegetable oils consumed. Soybean oil acquired this dominant status after World War II by shifting places with cottonseed oil. While cottonseed now holds a relatively minor position in the industry, it still constitutes a fifth of all salad and cooking oils.

The increased use of vegetable oils caused another major shift in the same period; oils formed the principal fat ingredient in solid shortening and the only fat in salad and cooking oils. These products took the following percentages of domestic vegetable oil production: soybean, 61; cottonseed, 72; peanut, 89; corn, 60; safflower, 21; and 11 percent of the coconut oil produced from imported copra. The shortening industry also used much of the domestic production of animal fats--30 percent of the lard and 90 percent of edible beef fats.

Vegetable oils moved into the dominant position among fats and oils because (1) the increasingly widespread use of hydrogenation made possible for the first time the manufacture of solid shortening entirely from vegetable oils; (2) a constant supply is available; and (3) the diet- and cholesterol-conscious U.S. public shifted from using solid (saturated) to liquid (unsaturated) fats. During the past two decades, industry satisfied consumer demands for unsaturated fats by producing greater quantities of vegetable solid and liquid shortening, and by using more of them in commercial food preparation.

In 1968, Americans consumed 29.7 pounds of fats per person in the form of solid shortening and salad and cooking oils, representing 55 percent of all fat intake in that year. Of this intake, 16.2 pounds was solid shortening, and 13.5, salad or cooking oils. Consumption of these fats continues to increase: 72 percent for shortening since 1947; 59 percent for salad and cooking oils since 1959. With continued population growth and increased per person consumption, these three products will probably lead the market for edible oils.

Retailers market the three products over a broad price range. Consumers recognize brands and types; both affect sales promotion for the products. With advertising strongly emphasizing brands in consumer buying, brand marketing is expected to continue influencing buyers. Striking price differences characterize various brands, types of ingredients, types of retail outlets, and regional consuming areas. Retail prices usually were lower in chains and large independent stores than in small independent stores. Prices for a 3-pound pack of shortening at chain stores were as much as 17.5 cents lower than major brands in small independent stores, and up to 9.6 cents lower for minor brands in 1968.

The spreads between the mill value of crude vegetable oils in a 3-pound pack of shortening or a pint of salad or cooking oils and the retail selling prices of these products were usually greater for independent stores than for chains.

Major brands in both types of retail outlets had greater spreads than minor brands. Merchandising practices of retail grocers, especially chains' special prices and coupon offers, influence the size of retail margins.

Although some brands of shortening and oils are sold nationally, retail prices vary with costs for production, transportation, marketing, and location. In the last quarter of 1968, for example, spreads were as much as 10.7 cents for major brands of shortening in large Philadelphia and Seattle stores. Similar price spreads exist between other cities, brands, and sizes of stores.

The average mill-to-wholesale spread for all shortening sold in all types of retail outlets in 1968 was 41.6 cents for a 3-pound pack. The wholesale-retail spread was 13.7 cents. Both spreads increased during 1947-68.

For a pint of salad and cooking oil sold in all types of retail outlets in 1968, the wholesale spread was 28.4 cents and the retail spread, 9.2 cents.

The total value of crude vegetable oils and animal fats used in the three products in 1968 was estimated at a little over one-third the total value of shipments of these products. The other two-thirds (approximately) included other ingredients, labor, and services during production and marketing. The value of crude oils varied considerably since World War II, but has moved up in recent years. The trend toward higher cost will probably continue, with a greater share of the manufacturer's cost made up by noningredient costs.

SOYBEAN AND COTTONSEED OILS USED IN
SHORTENING AND SALAD AND COOKING OILS
•TRENDS •PRICES •SPREADS

By Thomas B. Smith, Agricultural Economist
Fibers and Grains Branch
Marketing Economics Division

INTRODUCTION

The shortening industry, the largest domestic market outlet for edible vegetable oils, has strong interdependent relationships between shortening manufacturers, processors of vegetable oils and oilseeds, and producers of oilseeds, particularly soybeans and cottonseed. Soybean and cottonseed oils are the principal fat ingredients in shortening and salad and cooking oils. The raw materials from which these oils are produced, soybeans and cottonseed, are the major U.S. oilseed crops. Farmers received \$3 billion in 1968 for soybeans and \$200 million for cottonseed. Vegetable oil processors received \$306 million for soybean oil used in producing shortening and salad and cooking oils, \$106 million for cottonseed oil, and \$86 million for other vegetable oils.

The shortening industry is also an important market outlet for edible animal fats. During 1968, 1,088 million pounds of animal fats valued at \$68 million were used in manufacturing shortening, representing 33 percent of all fats and oils used in shortening. Lard constituted 18.1 percent and edible tallow 14.6 percent of all fats and oils used in shortening.

In the last 25 years, animal fats lost ground to vegetable oils; the latter advanced from a subordinate to a principal position. More extensive use of vegetable oils and the trend for shortening and margarine manufacturers to produce more unsaturated products undoubtedly increased the ratio of unsaturated to saturated fatty acids in the visible fat portion of the diet.

The Food and Drug Administration has not established standards of identity for shortening and salad or cooking oils, but the generally accepted rule-of-thumb measure is 100-percent fat content for the three products. The generally accepted fat requirement by weight for solid shortening is 1 pound of refined oil for 1 pound of shortening; for salad and cooking oils, it is 0.9625 pound of refined oil per pint.

SHORTENINGS

Shortenings, the fat products used in the preparation of many foods, are called that because they give a "short" or friable quality to baked goods. Lard

and other edible animal fats remained the principal edible fats used as shortenings in the United States for many years, but since World War II, large quantities of vegetable oils have become available and now comprise the principal fat ingredient in shortening.

Soybeans, not grown extensively in this country before 1930, now constitute the most important source of oil used in shortenings. Other vegetable oils, such as cottonseed, corn, safflower, peanut, and palm, are also used.

Two basic types of shortening are usually manufactured: (1) solid shortening (usually containing simple bond carbon linkage, termed saturated fats) and (2) liquid shortening, (usually considered to be less saturated than solid shortening when the fatty acid content contains one or more double-bond carbon linkages) usually referred to as salad and cooking oils. Although the production of solid shortening was greater than the production of liquid shortening during 1968, the difference was minimal.

Solid shortening may be produced entirely from vegetable oils (by means of hydrogenation, described below), a blend of vegetable oils and animal fats, or from pure animal fats. In 1968, 65 percent, amounting to 2,138.9 million pounds, of total solid shortening production was manufactured entirely of pure vegetable oils and 35 percent, or 1,173.0 million pounds, was either manufactured of pure animal fats or a blend of animal fats and vegetable oils.

A new era in U.S. manufacturing of shortening began with the introduction of the hydrogenation process for fats and oils in the early 1900's. This process made possible for the first time the manufacture of solid shortening entirely from vegetable oils. With the advent of hydrogenation and a constant supply of vegetable oils (primarily cottonseed oil in the latter part of the 19th century), the seasonal availability of animal fats no longer restricted the shortening industry. The first semisolid shortenings using vegetable oil were prepared by blending liquid cottonseed oil with certain animal fats. They were called "compound or blended type shortenings," indicating a union of two or more ingredients in definite proportions. 1/

Shortenings may be made from a single hydrogenated fat, but they are usually made from blends of two or more such fats. In the hydrogenation process, hydrogen in the presence of a catalyst is added directly to points of unsaturation in the triglycerides to convert oils to semisolid form for greater utility in certain food uses, and to make the fat or oil resistant to rancidity. The hydrogen process can be controlled to produce shortenings having specific plasticity characteristics.

Two classes of shortening are manufactured in the United States: the compound or blended type and the all-hydrogenated type. The compound shortenings further divide into animal and vegetable fat compounds and all vegetable compounds. In the early days of shortening manufacture, a distinct difference in

1/ Food Fats and Oils, Institute of Shortening and Edible Oils, Inc., August 1963 and October 1968.

composition existed between products of the compound and all-hydrogenated types. When hydrogenation was used in preparation of compounds, the usual practice was to heavily hydrogenate a minimum proportion of oil and blend this with untreated oil. Now heavily hydrogenated oil is usually blended with lightly hydrogenated oil; sometimes even three or more fats and oils, all hydrogenated to different degrees, are blended. The distinction between compounds and all-hydrogenated shortenings is no longer clear-cut. The makeup of the two products, however, still comprises different characteristics. Manufacturers more carefully and thoroughly refine and deodorize all hydrogenated shortenings, which are generally of higher quality than compound shortenings.

Before 1961, manufacturers processed most hydrogenated shortenings under conditions that substantially reduced the polyunsaturate content of the fats to levels ranging from 5 to 12 percent, and iodine values from 65 to 75. In response to research findings suggesting the advisability of more unsaturated fatty acids in the diet, some manufacturers of shortenings now produce these products with substantially higher levels of polyunsaturates. These shortenings contain 22 to 23 percent polyunsaturated triglycerides and have iodine values ranging from 85 to 95. These products have been referred to by doctors and medical research workers as "special" shortenings because in addition to their use in normal diets, they are also suitable for use in "special" diets where an increased level of linoleic acid is desired.

Liquid shortening (salad and cooking oils) is prepared from vegetable oils that have been refined, bleached, deodorized, and sometimes lightly hydrogenated. They may be produced entirely from one type of oil or from a blend of two or more oils.

Of the liquid shortening produced during 1968, 67.5 percent or 2,021.5 million pounds was manufactured of pure soybean oil and 32.5 percent or 974.4 million pounds from other vegetable oils composed either of pure cottonseed, peanut, safflower, or corn oils, or of a blend of two or more of these.

Many housewives have become diet- and cholesterol-conscious in recent years as a result of industry's advertising the importance of polyunsaturates in fat and oil products. Many housewives have shifted from using solid to liquid fats and from animal fats to vegetable oils, because they generally feel that the polyunsaturates of some liquid vegetable oils hold some health advantages over the more saturated fatty acid components of other vegetable oils and animal fats. However, concern over cholesterol in the diet apparently has not diminished the total quantity of fat intake. Per capita consumption of fats has been fairly constant over the past 20 years--about 45 pounds per person--but it was up to 49 pounds during 1967 and 51 pounds during 1968.

In recent years, an increasing number of processors have shown an awareness of the Nation's health consciousness by changing the ingredients in their products. As an example, corn and safflower oils are increasingly used in cooking and salad oils and in margarine. These two oils contain a high proportion of linoleic--a polyunsaturated fatty acid component that is an essential dietary substance. Although some manufacturers may await further medical research results on fat in diets, others have made health an important part of their promotional and sales campaigns. Consequently, shortening manufacturers now process and market quantities of liquid shortenings, 3.0 billion pounds during 1968,

compared with 1.8 billion pounds during 1959 (table 1). Liquid shortening has attained wide usage and good consumer acceptance. These shortenings, based upon various liquid or lightly hydrogenated liquid vegetable oils, have poly-unsaturated oil contents ranging from 30 to 50 percent, and iodine values ranging from 95 to 125.

Manufacturers of Shortening and Salad and Cooking Oils--Strong
Market Outlets for Fats and Oils

Fats and oils move into processing channels to be made into finished products faster than any other segment of the food processing industry. In 1968, this industry used approximately two-thirds of the domestic production of edible vegetable oils in manufacturing shortening and salad and cooking oils. These crude oils' estimated value was almost \$500 million, a considerable boost to the economy. The 1968 production and value of the fats and oils used in manufacturing these products is shown in table 2.

Trends

Production

Production of shortening and salad and cooking oils has expanded rapidly during the past 30 years. During that period, the production of solid shortening more than doubled, and the production of "edible oils" (primarily salad and cooking oils) more than tripled. In 1939, 1,404 million pounds of shortening was produced; by 1968 production had jumped to 3,312 million pounds--an increase of 136 percent. During this period, most of the shortening manufactured was consumed domestically, with the annual consumption almost keeping pace with production. As an example, of the 3,312 million pounds produced during 1968, 3,211 million pounds were consumed in the United States, 53 million pounds were utilized by the military, and 44 million pounds were exported, leaving a carry-over in stocks at the end of the year of a little over 100 million pounds (table 3).

The production and use of salad and cooking oils has been reported separately from edible oils only since 1959, but since then, production increased considerably. The 2,996 million pounds of salad and cooking oils produced in 1968 was 66 percent more than 1959 production. Most of the output was consumed each year, with relatively small carryover (table 1).

Consumption

Shortening: Since 1947, substitution has taken place both within the solid cooking food fat group as well as between solid and liquid cooking fats. During 1947-68, total consumption of solid cooking fats, consisting of direct use of lard plus the consumption of solid shortening has been fairly stable, averaging 22 pounds per person. However, during this period, the direct use of lard has decreased from 12.6 pounds per person to 5.6 pounds, but this drop was almost completely offset by increased consumption of shortening, which increased from 9.4 pounds per person in 1947 to 16.2 pounds in 1968. Per person consumption

Table 1.--Salad and cooking oils: Production, supply, and disposition, 1959-69

Year	Production:		Imports:		Stocks, January 1:		Total supply:		Exports and shipment:		United States total used:	
	Quantity:	Percentage:	Quantity:	Percentage:	Quantity:	Percentage:	Quantity:	Percentage:	Quantity:	Percentage:	Quantity:	Percentage:
	Mil. lb.	Mil. lb.	Percent	Mil. lb.	Percent	Mil. lb.	Percent	Mil. lb.	Percent	Mil. lb.	Percent	
1959.....	1,808	54	3.0	56	3.1	1,918	353	19.5	1,512	83.6		
1960.....	1,915	51	2.7	53	2.8	2,019	312	16.3	1,647	86.0		
1961.....	2,124	59	2.8	60	2.8	2,243	352	16.6	1,690	79.6		
1962.....	2,532	58	2.3	200	7.9	2,790	474	18.7	2,043	80.7		
1963.....	2,359	33	1.4	273	11.6	2,665	440	18.7	2,080	88.2		
1964.....	2,846	67	2.4	145	5.1	3,058	659	23.2	2,280	80.1		
1965.....	2,773	44	1.6	119	4.3	2,936	422	15.2	2,428	87.6		
1966.....	2,947	49	1.7	86	2.9	3,082	496	16.8	2,502	84.9		
1967.....	2,922	56	1.9	83	2.8	3,061	460	15.7	2,514	86.2		
1968.....	2,996	63	2.1	80	2.7	3,139	350	11.7	2,709	90.4		
1969.....	--	--	--	--	--	--	--	--	--	--		

Note: Edible oil for civilian consumption (major components: was salad and cooking oils) was 774 million pounds in 1939, and 1,032 for 1947. The end-uses of edible oils consumed was not broken out of the "edible oils category" before 1959.

Source: ERS, Fats and Oils Situation, 242, April 1968.

Table 2.--Proportion and value of domestically produced fats and oils used by manufacturers in shortening and salad and cooking oils, 1968

User and commodity	Percentage of domestic production	Value <u>1/</u> <u>Mil. dol.</u>
	<u>Pct.</u>	
Manufacturers of solid shortening:		
Crude soybean oil.....	31.4	156.0
Crude cottonseed oil.....	23.5	34.0
Crude coconut oil.....	11.2	8.0
Peanut oil.....	10.5	3.0
Corn oil.....	2.4	1.7
Crude palm oil.....	<u>2/</u>	11.0
Safflower oil.....	1.7	0.3
Other oils (2 million pounds).....	<u>3/</u>	0.2
Lard.....	30.0	37.0
Beef fats.....	90.0	31.0
Manufacturers of salad and cooking oils:		
Crude soybean oil.....	29.2	148.0
Cottonseed oil.....	48.9	71.0
Peanut oil.....	78.0	19.0
Corn oil.....	57.6	40.0
Safflower oil.....	19.2	3.0

1/ Estimated.

2/ 78 million pounds of imported palm oil.

3/ Not classified as to type of oil.

Table 3.—Shortening: Production, supply, and disposition, 5-year averages and annual, 1939-69

Year	Production		Stocks January 1		Total supply		Exports and shipments		Military uses		United States total used	
	:Percentage:		:Percentage:		:Percentage:		:Percentage:		:Percentage:		:Percentage:	
	Quantity of supply	of supply	Quantity of production	of production	Quantity of production	of production						
	Mil. lb.	Percent	Mil. lb.	Percent	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Mil. lb.	Percent
1939.....	1,404	96.1	56	4.0	1,461	8	0.6	--	--	1,396	99.4	
1944.....	1,363	95.2	67	4.9	1,431	19	1.4	212	15.6	1,147	84.2	
1949.....	1,487	95.7	67	4.5	1,554	26	1.7	12	0.8	1,435	96.5	
1954.....	1,961	95.4	94	4.8	2,055	17	0.9	45	2.3	1,870	95.4	
1959.....	2,252	94.6	127	5.6	2,380	36	1.6	32	1.4	2,196	97.5	
1960.....	2,313	95.3	115	5.0	2,428	31	1.3	39	1.7	2,238	96.8	
1961.....	2,456	95.3	120	4.9	2,576	92	3.7	51	2.1	2,311	94.1	
1962.....	2,689	95.6	123	4.6	2,812	139	5.2	39	1.4	2,469	81.8	
1963.....	2,584	94.0	165	6.4	2,749	66	2.6	39	1.5	2,525	97.7	
1964.....	2,664	95.7	119	4.5	2,783	21	0.8	43	1.6	2,598	97.5	
1965.....	2,792	95.8	121	4.3	2,913	42	1.5	57	2.0	2,695	96.5	
1966.....	3,181	96.5	117	3.7	3,298	41	1.3	59	1.9	3,079	96.8	
1967.....	3,226	96.4	119	3.7	3,345	39	1.2	58	1.8	3,108	96.3	
1968.....	3,312	96.0	139	4.2	3,451	44	1.4	53	1.6	3,211	96.9	
1969.....	--	--	143	--	--	--	--	--	--	--	--	--

of shortening increased 72 percent during 1947-68, whereas direct lard consumption per person dropped 56 percent. The shift to vegetable shortenings was first due primarily to the preference of housewives for a more uniform, high-quality shortening that was bland, odorless, and colorless. In recent years, the cholesterol consideration continued this trend towards vegetable shortenings.

Salad and Cooking Oils: Consumption of edible oils, has shown a fairly steady growth during 1947-68, rising from 6.9 pounds per person to 16 pounds in 1968. Beginning in 1959, census data showed the quantities of vegetable oils, by type, consumed in salad and cooking oils. This breakdown left in the "edible oils" category mainly the small quantities of unidentified vegetable oils used for miscellaneous purposes. In 1968, the consumption of salad and cooking oils per person was 13.5 pounds, while that of other edible oils not classified was 2.5 pounds per person; in 1947 consumption of edible oils (including salad and cooking oils) was 6.9 pounds per person. The increased consumption of salad and cooking oils during 1947-68 reflects the increased use of vegetable oils as such in the American diet, and also the growing commercial use of oils instead of solid fats in the production of such prepared foods as mayonnaise and salad dressings, potato chips, fried snack foods, frozen french fries, and mellarine.

Fats and Oils Used in the Manufacture of Shortening

During 1968, 3,326 million pounds of fats and oils were used in manufacturing shortening. Soybean oil has rapidly become the principal fat ingredient used in the production of the major food fat commodities such as shortening, salad and cooking oils, and margarine. Soybean oil comprised 55 percent of the total fats and oils used in the production of shortening. It has accounted for about 50 percent of the fat ingredients used in solid shortening during the past 21 years, but as recently as 1939 it represented only about 14 percent of the total. Soybean oils wide acceptance in the food industry is due in part to its increased and ready available supply. Its strong competitive position in the market stems from price and technological advancements in processing. In 1968, soybean oil represented 82 percent of the total volume of all vegetable oils used in the production of shortening.

Among other vegetable oils used in the production of shortening during 1968, cottonseed oil accounted for only 7.5 percent of the total (all fats and oils), coconut oil, 1.2 percent; peanut oil, 0.6 percent; corn oil, 0.3 percent; palm oil, 2.2 percent; safflower oil, 0.1 percent; other oils not identified, 0.1 percent. Animal fats accounted for almost one-third of the total fats and oils used in the production of shortening--lard, 18.1 percent; and beef fats, 14.6 percent. Almost 30 years ago, cottonseed oil was the principal fat ingredient used in shortening. In 1939, it accounted for more than two-thirds of all fats and oils used, but now it is a relatively minor oil ingredient in shortening, accounting for only about 8 percent of the total fats used.

Edible animal fats have played an increasingly more important role as shortening ingredients during the past 15 years. In 1968, edible animal fats accounted for 33 percent of all fats and oils used in the manufacture of shortening, compared with 12 percent in 1950 and 6 percent in 1939. The quantity of lard used in shortening in 1968 was 5 times greater than in 1947, and the quantity of beef fat (edible tallow) used was more than 8 times greater in 1968 than it

was in 1947. Lard currently accounts for a little larger share of the total fat ingredients of shortening than edible beef fats, although in recent years, use of beef fat increased at a more rapid rate than lard. In 1968, lard accounted for 18 percent of the total and edible beef fats, 15 percent; in 1950, these proportions were 10.2 and 1.8 percent.

The economic advantage of lard and edible tallow over vegetable oil has been an important factor in their increased usage in shortening. Other factors include the development of pure animal fat shortenings and new formulations to blend lard with vegetable oils in shortening compounds and still maintain high quality and good performance of the shortening product.

The quantity of the different fats and oils used reflects some sensitivity to wholesale price of the fats or oils, with quantity varying inversely with price (figs. 1 and 2). A manufacturer's formula may also limit substitution between oils, if it lowers product quality below his standards.

Fats and Oils Used in the Manufacture of Salad and Cooking Oils

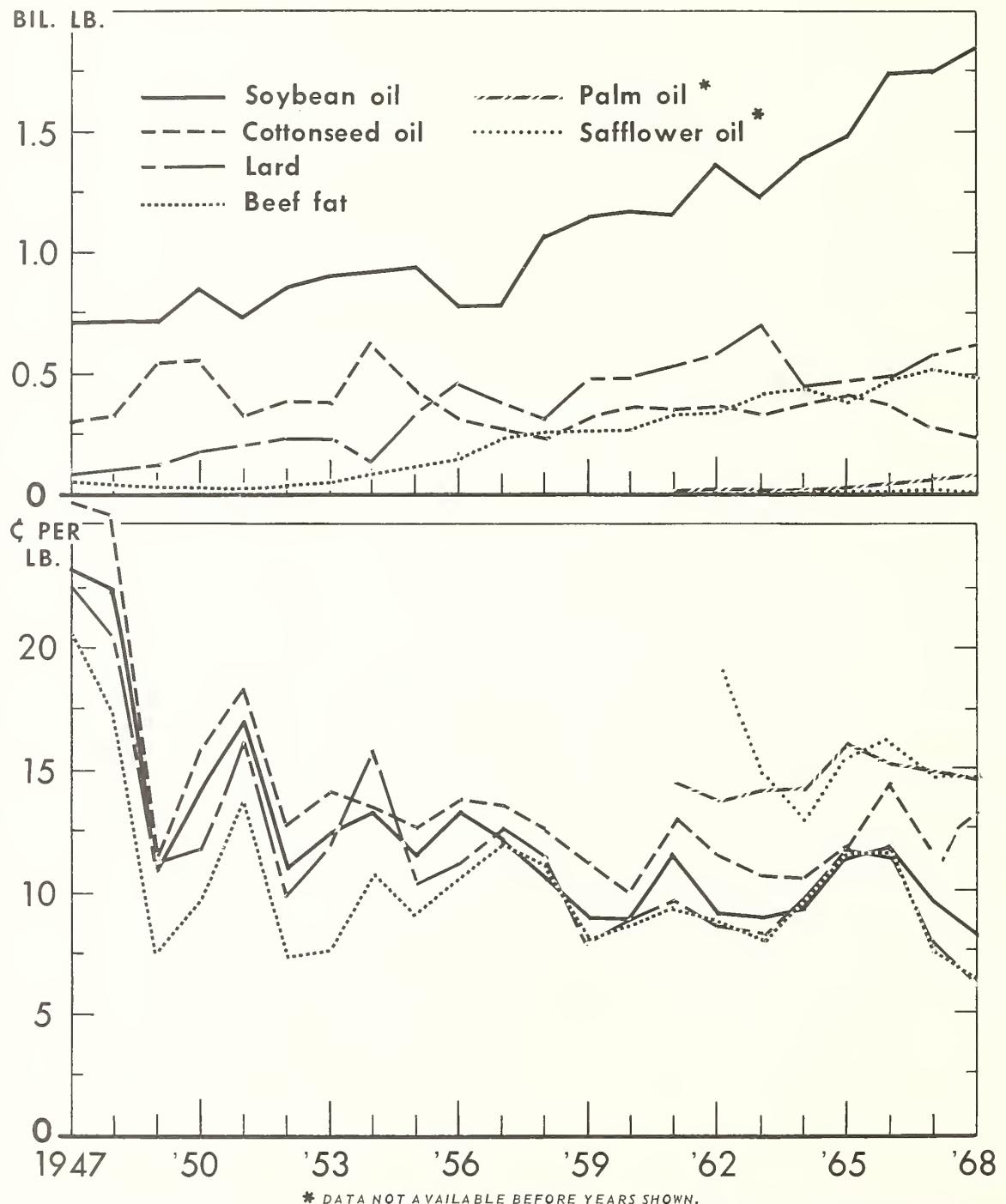
During 1968, 2,996 million pounds of salad and cooking oils were manufactured, an increase of 65.7 percent over 1959, (since 1959 salad and cooking oils have been shown separately from the "Other Edible Oils" group as classified by the Bureau of the Census). As in the production of solid shortening, soybean oil is the major oil used in manufacturing salad and cooking oils (table 1). During 1968, soybean oil accounted for 65 percent of total vegetable oils used in manufacturing salad and cooking oils and the quantity of soybean oil used in relation to other oils has been increasing since 1959. Other vegetable oils used during 1968, and their relative importance to total oils used, were cotton-seed oil, 19.5 percent of the total; corn oil, 9.1 percent; peanut oil, 5.9 percent; and safflower oil, 0.8 percent (fig. 3).

Size of Packages

Shortening.--In 1968, manufacturers packaged 25 percent of solid shortening in 1- to 8-pound packages; 43 percent went into containers larger than 8 pounds, but no larger than drums (drums contain about 440 pounds). The remaining 32 percent was distributed in bulk; this type of distribution increased considerably after 1958--from 15 percent of the total manufactured in that year to almost one-third in 1968. The increase probably stems from the growing quantity of shortening moving into institutional and commercial channels and from the economy of purchase and movement in bulk instead of packaged form. Conversely, packaging and distributing in 1- to 8-pound packages dropped from 41 percent in 1958 to 25 percent in 1968, but packaging in the over 8 pound but not larger than drum group dropped only slightly--from 44 percent of the total manufactured to 43.

Salad and cooking oils.--Manufacturers packed 26 percent of the 1968 salad and cooking oil line for distribution in containers of 1-gallon size or under; 6 percent was packed in containers larger than a gallon but no larger than a drum; and 68 was distributed in bulk larger than a drum. The quantity packed in the 1-gallon size and under increased from 18 percent of the total in 1958

SHORTENING: FATS AND OILS USED IN PRODUCTION AND WHOLESALE PRICES, BY TYPE

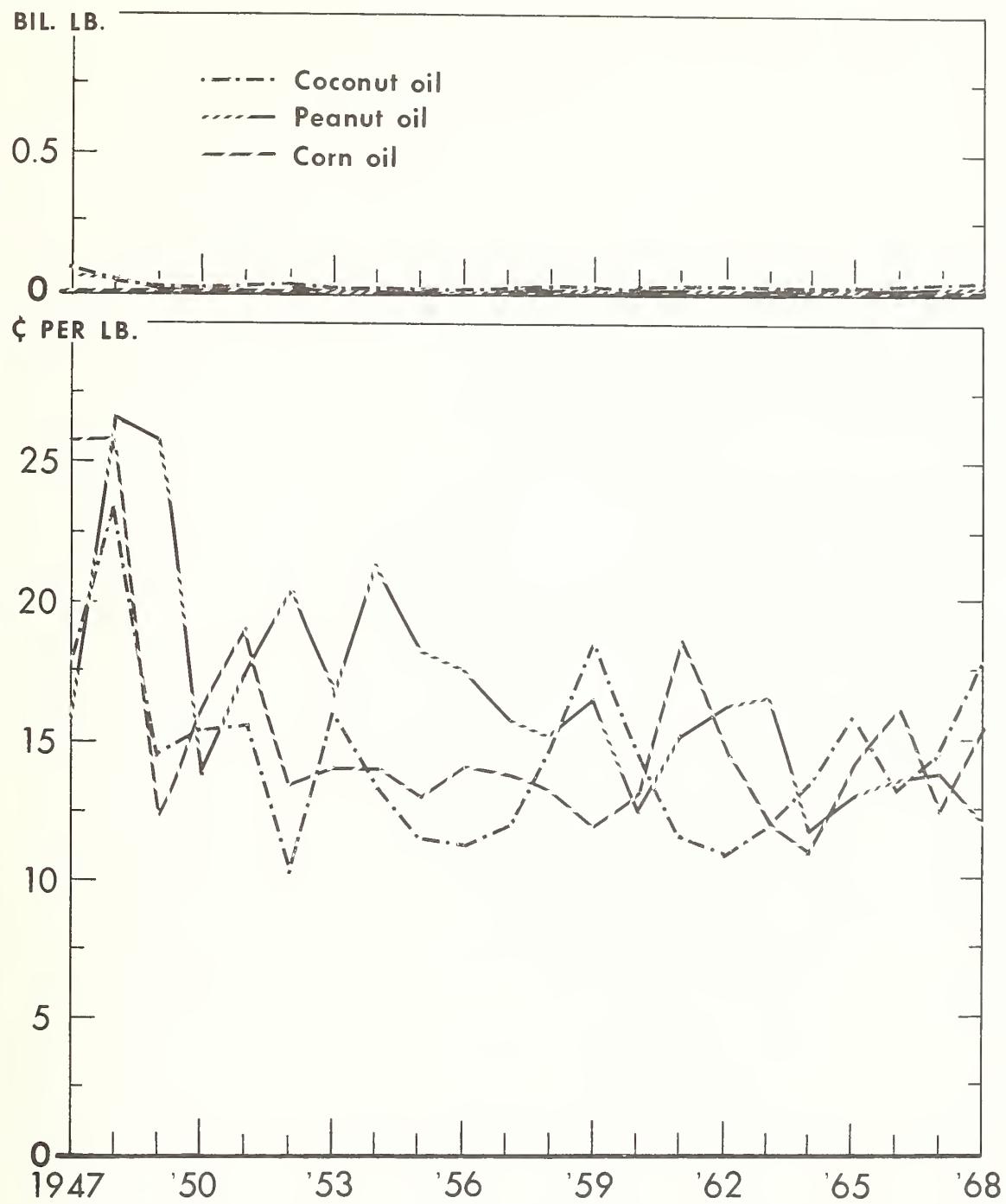


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Figure 1

SHORTENING: FATS AND OILS USED IN PRODUCTION AND WHOLESALE PRICES, BY TYPE

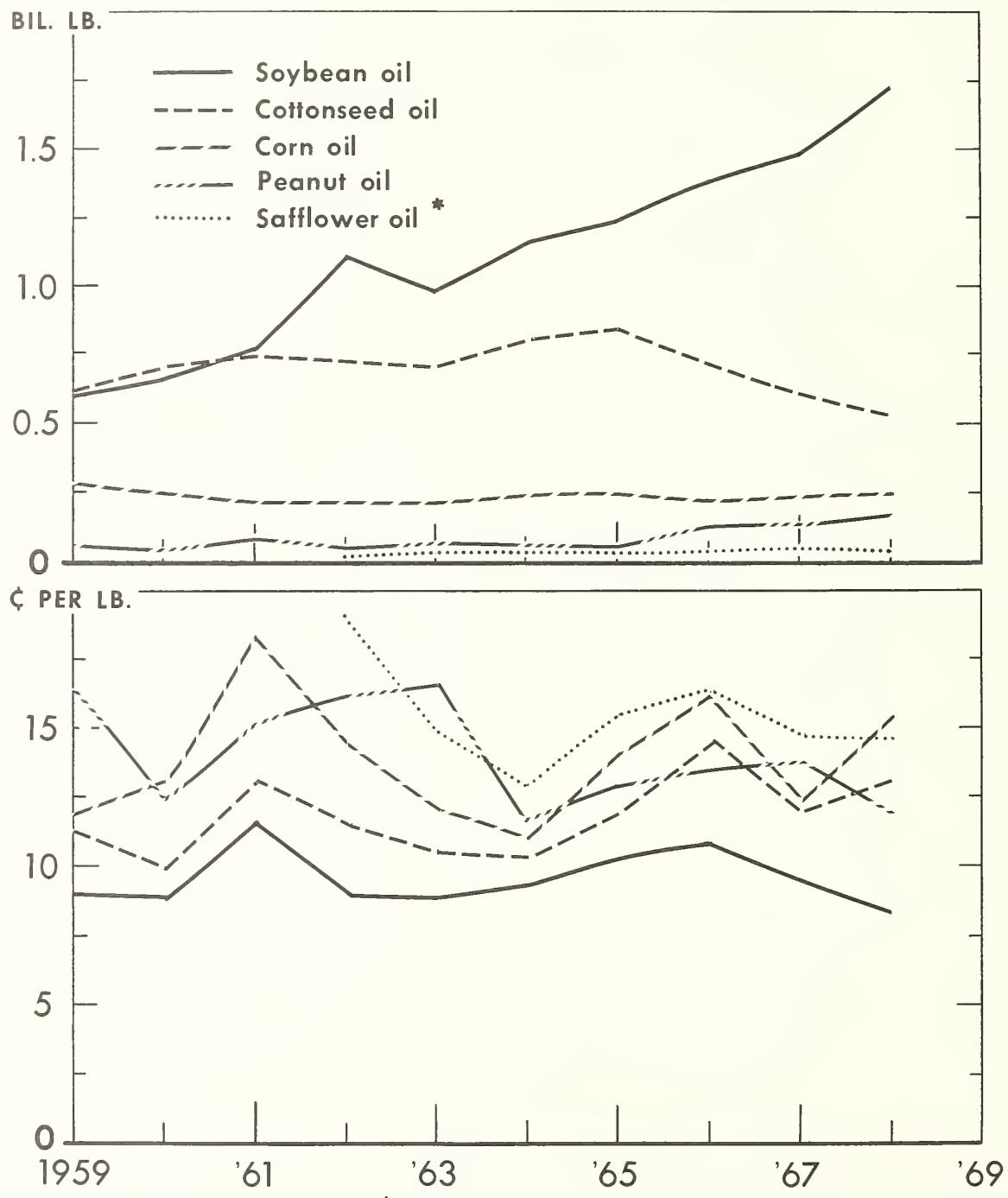


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Figure 2

SALAD AND COOKING OILS: VEGETABLE OILS USED IN PRODUCTION AND WHOLESALE PRICES, BY TYPE



* DATA NOT AVAILABLE BEFORE 1962.

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NEG. ERS 7687-70 (6) ECONOMIC RESEARCH SERVICE

Figure 3

to 26 in 1968. This probably reflects, in part, the increased consumer use of liquid fats instead of solid fats in recent years. The quantity packed in containers larger than a gallon but not larger than a drum, and bulk containers larger than a drum, decreased slightly--from 9 percent of the total in 1958 to 6 percent in 1968. Bulk containers larger than drums dropped from 72 percent of the total in 1958 to 68 percent in 1968.

Number of Establishments

The number of establishments processing shortening and salad and cooking oils decreased 12 percent, while the average size of facilities increased in the postwar years up into the sixties. The average value of shipments in this period increased 17.5 percent, and the value added to the manufactured process increased 24.6 percent. The increasing size of facilities was also indicated by the sharp drop in the number employing small work forces and an increase in the number employing larger work force in the various employee size groups. Firms employing 1 to 19 employees decreased 47.3 percent, firms employing 20 to 99 workers increased 5.4 percent, and those employing 100 to 199 workers increased 30.2 percent during the period. Firms employing 500 and more workers increased 4.9 percent.

The trend toward fewer and larger firms should continue, as management strives to increase efficiency and reduce operating costs by installing new and improved machinery and equipment, and applying new and more efficient operating methods and techniques. Important technological development introduced during the postwar period aided in increased efficiency and in turning out a product more acceptable to consumers. Among these were hydrogenation and improved refining methods such as miscella refining, solidifying, and deodorizing. These developments made possible wider food uses of vegetable oils. New technologies should continue to develop and be adopted as firms in the industry aim to satisfy the increasing consumer demand for fats and oils products.

Manufacturing Costs

In manufacturing shortening and cooking oils, soybean and cottonseed oils, the two most important raw materials components, cost most. In 1963, they accounted for 45.2 percent of the wholesale value of shortening and salad and cooking oil shipments. Lard and edible beef fats represented 6.8 percent of the value of shipments of finished products (shortening and salad and cooking oils). All fat and oil ingredients combined represented 51.9 percent of the shipping value of the finished products. All other ingredients (other than fats and oils), containers, and supplies accounted for 22.2 percent, with wages and salaries accounting for 6.7 percent, and fuel, electric energy, contract and commission work, resales expenditures on plant and equipment and costs not identified accounting for 19.2 percent of the value of shipments of the finished products (table 4).

Table 4.--Shortening and cooking oils: Value of shipments and average manufacturing expenses by major cost items

Item	Total delivery cost of shipment	
	<u>Dollars</u>	<u>Percentage distribution</u>
Total value of shipments.....	1,324,357	100.00
Cost of materials.....	980,939	74.07
Tallow and stearin, edible.....	32,630	2.46
Cottonseed oil, crude.....	140,341	10.60
Cottonseed oil, refined.....	39,210	2.96
Soybean oil, crude.....	316,779	23.92
Soybean oil, refined.....	101,565	7.67
Lard.....	57,148	4.32
Containers:		
Glass (Gross).....	17,488	1.32
Metal, excluding drums.....	38,047	2.87
Paper and paperboard containers.....	32,888	2.48
All other materials, ingredients containers, and supplies consumed....	191,500	14.46
Materials, ingredients, containers and supplies, n.s.k. 1/.....	13,343	1.01
Salaries and wages.....	88,606	6.69
Fuel.....	8,186	.62
Purchased electric energy.....	4,487	.34
Contract and commission work.....	979	.07
Cost of the sales.....	67,358	5.09
Expenditures, plant equipment.....	19,759	1.49

1/ Represents total cost of materials for small firms reporting on "short-forms" where separate figures for individual materials consumed were not requested, and total cost of materials reported for these establishments which failed to report cost of individual materials on "standard forms". (n.s.k.--not specified by kind).

Source: Adapted from Census of Manufactures--Table 7A-Materials by Kind, 1963.

Distribution

The physical movement of shortening and salad and cooking oils to consuming points is made primarily by rail and by motor carriers. During 1963 there were 880 million ton-miles of shipments. Of the 2,329,000 tons of shortening and salad and cooking oils shipped, 43.2 percent went by rail, 37.3 percent by motor carriers, 13.9 percent by private truck, and 0.4 percent by water; for 5.2 percent

the mode of transportation was not specified. Irrespective of means of transportation, 52.6 percent of the quantity shipped went less than 300 miles, 46.4 percent was moved from 300 to 2,000 miles, and 1.0 percent was shipped 2,000 miles and over.

PRICE TRENDS

Unit Price

Prices for a 3-pound pack of shortening and for 24 ounces of salad and cooking oils varied widely. The quality and price of oils used per unit of product are important factors influencing price variation among these products. However, requirements for labor and other inputs vary among products and doubtless also influence price variations. During 1968, the average price received by retail stores for a 3-pound pack of vegetable shortening was 83.9 cents. Retail price variations for vegetable shortening during 1947-68 extended from 81.5 cents to 114.8 cents for a 3-pound pack (table 5). Average retail prices for 24 ounces of salad and cooking oils in 1964-68 also varied considerably, ranging from 43.4 cents for 24 ounces to 54.2 cents (table 6).

Some brands of shortening and salad and cooking oils are sold nationally, but retail prices in various locations shift with differences in costs of production and marketing or other factors. Geographic price differences through the price variations for a 3-pound pack of vegetable shortening and for a 24-ounce container of salad and cooking oils are shown in tables 7 and 8, by geographic location and size of store within the major and minor brand groups. For example, during the last quarter of 1968, the average price for major brands sold by large retail stores in Philadelphia, Pa., was 88.9 cents for a 3-pound grocery pack of vegetable shortening; it cost 84.9 cents in 1963, a difference of 4 cents. Minor brands in large stores cost 74.8 cents in 1968 and 67.5 cents in 1963, a difference of 7.3 cents (table 7). Prices varied much the same way in other locations and in stores of different size for shortening and salad and cooking oils (table 8). (Although unpublished, similar price data are available for cottonseed, safflower, corn, and peanut oils).

Price Differences

Leading manufacturers of shortenings and salad and cooking oils can successfully differentiate their products through such factors as ingredients, taste, brands, and advertising. Advertising and brand names have been widely used in introducing shortening and salad and cooking oil products to the public. Some chain stores have concentrated on developing buyer (minor or store) brands which are usually lower priced than the national brands.

Retail grocery merchandising practices influence the size of the retail margins. Many retailers, especially chains, often advertise discount coupons and special prices on shortening to attract customers, usually on weekends. When advertised special reduced prices originate with the manufacturer, the retailer is compensated for the difference. The many different brands, types of retail outlets, geographic location of outlets, and merchandising practices all

Table 5.--Vegetable shortening: Value of crude oils used in a 3-pound grocery pack, farm value, mill value, factory cost, price spreads, and prices, 1947-68

Year	Value received by farmers, \$	Farm-mill: Mill cost of oil, \$	Factory: mill basis, \$	Factory: crude oil basis, \$	Mill: wholesale: cost, \$	Wholesale: spread, \$	Wholesale: value, \$	Retail: spread, \$	Retail: price, \$	Farm-retail: spread, \$	Farm-retail: share, %
	1/	2/	3/	4/	5/	6/	7/	8/	9/	10/	11/
Cents											
1947.....	46.45	30.95	77.40	--	NA	--	25.5	102.9	11.9	114.8	68.4
1948.....	54.46	20.48	74.94	--	NA	--	26.7	101.6	12.2	113.8	59.3
1949.....	27.51	8.61	36.12	--	NA	--	44.3	80.4	9.9	90.3	62.8
1950.....	32.57	15.0	47.58	--	NA	--	27.7	75.3	9.5	84.8	52.2
1951.....	39.97	15.2	55.14	--	NA	--	34.4	89.5	11.6	101.1	61.1
1952.....	29.78	6.5	36.24	--	NA	--	39.9	76.1	10.2	86.3	56.5
1953.....	34.85	6.0	40.80	--	NA	--	36.0	76.8	10.6	87.4	52.6
1954.....	31.04	11.3	42.30	--	NA	--	36.6	78.9	11.2	90.1	59.1
1955.....	31.41	6.3	37.74	--	NA	--	39.9	77.6	11.1	88.8	57.4
1956.....	31.67	10.3	42.00	--	NA	--	40.5	82.5	12.2	94.7	63.0
1957.....	31.98	7.5	39.51	--	NA	--	44.9	84.4	12.8	97.2	65.2
1958.....	27.62	6.9	34.50	--	NA	--	46.1	80.6	12.6	93.2	65.6
1959.....	23.21	6.7	29.94	--	NA	--	44.9	74.8	12.0	86.8	63.6
1960.....	22.94	5.7	28.59	--	NA	--	40.6	69.2	11.3	80.5	57.6
1961.....	27.65	9.8	37.47	--	NA	--	38.3	75.8	12.6	88.4	60.8
1962.....	24.84	5.3	30.12	28.9	59.0	15.3	44.2	74.3	12.7	87.0	62.2
1963.....	24.09	5.1	29.16	25.3	54.5	14.9	40.2	69.4	12.1	81.5	57.4
1964.....	26.10	3.4	29.49	25.0	54.5	12.4	37.4	66.9	12.0	78.9	52.8
1965.....	30.71	4.8	35.55	33.4	68.9	5.0	38.4	73.9	13.4	87.3	56.6
1966.....	28.29	10.2	38.46	--	NA	--	36.5	75.0	14.0	89.0	60.7
1967.....	27.14	4.3	31.44	--	NA	--	42.1	73.5	14.0	87.5	60.4
1968.....	23.71	4.9	28.59	--	NA	--	41.6	70.2	13.7	83.9	60.2
											28.3

1/ Estimated by deducting country shipper price spreads and mill price spreads for the value of crude oils at mill level. Estimates do not necessarily agree with Market Basket Statistics because of different methods used. 2/ Estimated by deducting the farm value of crude oils in 3 pounds of vegetable shortening from the mill cost of crude oils used in 3 pounds of shortening. 3/ Estimated by applying the crude oil requirement ratios for 3 pounds of vegetable shortening to the appropriate crude oil unit price of oils used in production. 4/ Difference between the value of 3 pounds of vegetable shortening at the factory level and the value of the oils used in production--oil mill basis. 5/ Cost f.o.b. factory for advertised brands of vegetable shortenings. Data obtained from the Institute of Shortening and Edible oils, Inc. 6/ Difference between the factory cost and the wholesale cost. 7/ Difference between the wholesale value and mill cost. For this report, only the estimated farm value of crude oil is deducted from the wholesale value of shortening to obtain the mill-wholesale price spread. The spread as shown, therefore, contains the cost of all ingredients other than oil used in shortening in addition to the manufacturers' operating costs and services. Other ingredients are nominal in quantity and value. 8/ Estimated by use of data from annual survey by Chain Store Age which shows retail spreads as percentage of retail price for selected years. Retail spreads for the year for which retail spread ratios were not specified, were estimated by use of the linear regression equation. These retail spread percentages were then deducted from 100.0 to determine the proportion of the retail price that represented wholesale value. Wholesale values were then determined by application of the wholesale value ratios to the retail price. 9/ Difference between retail and wholesale prices. 10/ Compiled from BLS prices. Obtained from Market Development and Performance Branch; Market Statistics Research Group, ERS. 11/ Difference between the retail price and the estimated farm value of oils used.

Table 6.--Farm value and mill value of crude oils in 24 ounces of salad and cooking oil; average price received per 24 ounces by wholesale and retail stores; and the farm-mill, wholesalers and retail price spreads, 1964-68

Year	Value received by farmers, crude oil basis; 1/	Farm-mill: price of oil, crude basis; 2/	Mill cost: factory cost 3/	Factory: wholesale; spread 4/	Mill: wholesale; value 5/	Wholesale: retail value 6/	Retail price 7/	Farm- retail spread 10/ 11/	Farmer's share
- - - - - Cents - - - - -									
1964.....	12.2	2.7	14.9	14.2	29.1	7.3	21.5	36.4	7.0
1965.....	13.5	4.3	17.8	19.9	37.7	1.9	21.8	39.6	7.8
1966.....	13.2	6.4	19.6	--	NA	--	24.0	43.6	8.8
1967.....	13.0	3.2	16.2	--	NA	--	28.6	44.8	9.3
1968.....	11.7	3.7	15.4	--	NA	--	28.4	43.0	9.2

1/ Estimated by deducting country shippers' price spreads and mill price spreads from the value of crude oils at mill level. Estimates do not necessarily agree with Market Basket Statistics because of different methods used.

2/ Estimated by subtracting the farm value of crude oil in 24 ounces of salad and cooking oil from the mill cost of crude oils used in 24 ounces of salad and cooking oils.

3/ Estimated by applying the crude oil requirement ratios for 24 ounces of salad and cooking oil to the appropriate crude oil unit price of oils used in production.

4/ Difference between value of 24 ounces of salad and cooking oil at the factory level and the value of the oils used in production--oil mill basis.

5/ Cost f.o.b. factory for advertised brands of salad and cooking oils. Data obtained from the Institute of Shortening and Edible Oils, Inc. for 1 pint of salad and cooking oil. The price per pint was adjusted to a 24-ounce price by multiplying the price per pint by 150 percent.

6/ Difference between the factory cost and the wholesale cost.

7/ Difference between wholesale value and mill cost.

8/ Estimated from data in annual survey by Chain Store Age, which shows retail spreads as a percentage of retail price. Retail spread was estimated by use of linear regression equation. These percentages were deducted from 100.0 to determine the proportion of the wholesale value represented in the retail value. The percentages were then applied to the retail values to determine wholesale value.

9/ Difference between the retail and wholesale prices.

10/ Compiled from BLS prices by Market Development and Performance Branch, Market Statistics Research Group, Marketing Economics Division, ERS.

11/ Difference between the retail price and the estimated farm value of oils used.

Table 7.—Shortening, major and minor brands: Quarterly retail prices per 3-pound grocery pack in large stores, and differentials from large stores, specified cities, 1968

Quarter and city	Major brands			Minor brands		
	Large 1/	city average	Differential from large	Large 1/	City average	Differential from large
			Cents			
1st quarter:						
Atlanta.....	85.7	+2.1	+5.7	+7.2	69.0	+2.1
Chicago.....	87.7	+1.2	+1.7	+5.2	71.9	4/
Houston.....	87.2	-2.0	-6.8	+1.4	67.0	4/
Los Angeles.....	84.8	+2.0	+5.4	+9.1	68.4	4/
Philadelphia.....	85.7	+1.5	+3.3	+5.5	70.9	+2.7
Seattle.....	80.0	+3.8	+6.4	+10.5	72.8	4/
2nd quarter:						
Atlanta.....	81.2	+3.1	+7.2	+11.0	65.4	+2.9
Chicago.....	84.0	+2.1	+5.9	+7.0	70.6	4/
Houston.....	84.0	+5.5	-1.2	+4.3	66.4	4/
Los Angeles.....	82.0	+2.1	+5.2	+9.3	66.6	4/
Philadelphia.....	76.5	+4.8	+12.7	+17.5	75.6	+1.2
Seattle.....	76.8	+4.6	+8.5	+12.1	69.3	+4.0
3rd quarter:						
Atlanta.....	78.5	+4.4	+11.4	+15.4	69.7	+2.6
Chicago.....	87.5	+1.1	+2.9	+4.0	75.1	4/
Houston.....	86.6	-6	-2.6	+1.4	66.4	-1.2
Los Angeles.....	83.4	+2.0	+5.3	+8.3	68.0	4/
Philadelphia.....	89.4	+8	--	+3.5	71.6	+2.5
Seattle.....	78.9	+3.0	+5.3	+8.3	69.8	+3.2
4th quarter:						
Atlanta.....	81.8	+2.6	+6.6	+9.3	68.3	+2.5
Chicago.....	86.9	+1.5	+2.7	+6.2	77.6	4/
Houston.....	86.2	-7	-2.9	+1.5	68.0	4/
Los Angeles.....	81.9	+2.1	+5.5	+8.8	67.7	4/
Philadelphia.....	88.9	+8	-7	+4.0	74.8	+1.1
Seattle.....	78.2	+2.8	+4.9	+7.8	66.6	4/

1/ Chain stores.

2/ Large independent grocery stores.

4/ Insufficient number of quotations

Table 8.--Soybean salad, and cooking oil: Quarterly retail prices per pint in large stores, and differentials from large stores, specified cities, 1968

Quarter and city	Major brands				
	Large <u>1/</u>	Differential from large			
		City average	Medium <u>2/</u>	Small <u>3/</u>	
:					
: - - - - - Cents - - - - -					
:					
1st quarter:	:				
	:				
Atlanta.....	42.9	-1.0	-1.3	-4.1	
Chicago.....	41.0	0.3	-0.3	2.2	
Houston.....	35.1	3.7	6.7	6.6	
Los Angeles.....	33.8	2.2	4.0	9.5	
Philadelphia.....	38.9	.9	3.2	3.2	
Seattle.....	40.3	1.5	3.6	3.0	
	:				
2nd quarter:	:				
	:				
Atlanta.....	36.9	1.3	4.6	4.1	
Chicago.....	41.6	-.5	-2.9	-.2	
Houston.....	36.2	2.7	6.4	2.4	
Los Angeles.....	35.0	1.3	3.1	5.9	
Philadelphia.....	38.6	1.1	1.2	4.4	
Seattle.....	40.3	.7	3.4	-1.1	
	:				
3rd quarter:	:				
	:				
Atlanta.....	35.8	1.7	4.1	5.9	
Chicago.....	41.6	-.5	-1.6	-1.4	
Houston.....	36.8	2.6	6.0	2.6	
Los Angeles.....	35.2	1.1	1.1	7.2	
Philadelphia.....	39.0	.6	.8	2.5	
Seattle.....	39.9	1.5	4.3	1.7	
	:				
4th quarter:	:				
	:				
Atlanta.....	39.1	.5	2.3	1.2	
Chicago.....	41.8	-.4	-3.0	.4	
Houston.....	39.0	1.9	4.8	1.1	
Los Angeles.....	36.5	1.0	1.1	4.6	
Philadelphia.....	39.4	.8	.7	3.4	
Seattle.....	39.9	1.3	3.5	2.1	
	:				

1/ Chain stores.

2/ Large independent grocery stores.

3/ Small independent grocery stores.

contribute to the multiplicity of prices and the wide price span existing for the three products. 2/ Some elements contributing to these price differences include costs of production, marketing practices, and advertising. Price data for shortening and salad and cooking oils reflect some of the influences of merchandising practices, brand names, types of retail outlets, and geographic location. These data indicate that the retail selling prices of shortening and salad and cooking oils are considerably different for the chain (large) and the independent (medium and small) grocery stores and between the major (advertised) and minor (usually unadvertised) brands of shortening within a particular type of retail outlet. 3/ There are also price differences among the different cities within any type of retail outlet and brand group. Prices were generally higher in independent retail grocery stores for both major and minor brands of shortening than at retail chain stores. As an example, data for Atlanta for the last quarter of 1968 showed that in large retail outlets the average selling price of a 3-pound grocery pack of major brand vegetable shortening was 6.6 cents lower than in medium-sized retail outlets, 9.3 cents lower than in small retail stores, and 2.6 cents lower than the city average. Minor brand prices of vegetable shortening in large Atlanta retail stores during the same period were 8.7 cents lower than prices in medium stores, 7.9 cents lower than in small retail stores, and 2.5 cents lower than the city average price.

A more striking difference between retail prices of a 3-pound grocery pack of vegetable shortening occurred within each type of retail outlet. Retail prices for major brands sold in large Atlanta stores during the last quarter of 1968 were 13.5 cents higher than prices of minor brands in large stores. Prices for major brands in the medium-sized stores were 11.4 cents higher than comparable prices of minor brands. In small stores, prices of major brands were 14.9 cents higher than prices for minor brands. Advertising is one of the strong factors contributing to price differences between major and minor brands.

For salad and cooking oils, Houston data for the last quarter of 1968 showed that large retail outlets' average selling price for a pint of pure soybean oil was 4.8 cents lower than in medium-sized retail outlets, 1.1 cents lower than in small retail stores, and 1.9 cents lower than the city average price. The retail price of soybean oil in large Atlanta stores during the last quarter of 1963 averaged 30.8 cents per pint compared with 39.1 cents in 1968. Similar price changes took place in other cities and in other types of stores for soybean, cottonseed, corn, peanut, and safflower oils.

2/ Quarterly price data were obtained through the Bureau of Labor Statistics by type of retail outlet, major and minor brands, and by geographic region for a 3-pound grocery pack of vegetable shortening. For salad and cooking oils data were obtained for major brands only for 5 different pure cooking oils: soybean, cottonseed, safflower, corn oil, and peanut oils. In this report, 6 cities were selected to represent different U.S. marketing areas: Atlanta, Philadelphia, Chicago, Houston, Los Angeles, and Seattle.

3/ In this report stores are generally classified as follows: "large" refers to chain retail grocery stores; "medium" to large independent retail grocery stores; and "small" to small independent grocery stores.

Some brands of vegetable shortening and salad and cooking oils are sold nationally, but the retail prices vary with differences in costs of production, transportation, and marketing or because of other factors. During the last quarter of 1968, large-store prices for 3-pound grocery packs of major brand vegetable shortening varied from 78.2 cents in Seattle to 88.9 cents in Philadelphia, a difference of 10.7 cents. Differences in cost of production, marketing, and transportation costs result from price variance between geographic locations. A similar price pattern for major brands existed between cities and other sizes of stores for shortening, and salad and cooking oils.

Modal prices for major and minor brands also varied among stores of the same type. During the last quarter of 1968, the modal price for major brands of a 3-pound grocery pack of vegetable shortening sold by large retail grocers in Chicago was 89.0 cents; prices ranged from 79.0 to 89.0 cents per 3-pound pack; among the medium-sized grocery stores, the modal price was 85.0 cents in Atlanta with prices varying from 79.0 to 85.0 cents; and among small stores, the modal price was 89.0 cents. Similar price variations existed among major and minor brands in all types of stores at other locations.

For salad and cooking oils, the modal price of a pint of soybean oil for major brands sold by large stores, during the last quarter of 1968, was 44.0 cents in Chicago and in Seattle, with prices ranging from 35.3 to 44.0 cents a pint; among the medium-sized grocery stores, the modal price was 46.7 cents in Seattle with a price range of 38.7 to 52.0 cents; and among the small stores prices ranged from 35.3 to 44.0 cents per pint. Similar price variations existed in all types of stores and locations for all the salad and cooking oils.

Advertised Brands vs. Private Label

The average factory (manufacturing) cost of a 3-pound grocery pack of vegetable shortening differed considerably for the advertised brands and the private-label brands (usually unadvertised brands), and these price differences have apparently widened in recent years, probably because of the increasing cost of advertising. During 1965 the average cost of a 3-pound grocery pack of vegetable shortening, f.o.b. factory, was 68.94 cents for advertised brands, compared with 60.39 cents for private-label brands, a difference of 8.55 cents; in 1962, the prices were 58.95 cents for advertised brands and 54.33 cents for private labels, a difference of 4.62 cents. Similar price differences existed between advertised and unadvertised brands for a pint of salad and cooking oil. For example, in 1964 the wholesale cost of 1 pint of salad or cooking oils for advertised brands was 2.2 cents greater than it was for unadvertised brands; in 1965, this same price differential was 3.8 cents.

The price difference between advertised and unadvertised brands of vegetable shortening and salad and cooking oils is even greater at the retail level than at the wholesale level. In 1968, a 3-pound grocery pack of advertised brand vegetable shortening sold in large Philadelphia stores for 88.9 cents, while unadvertised brands sold for 74.8 cents--a difference of 14.1 cents.

PRICE SPREADS

Six price spreads were estimated for a 3-pound grocery pack of vegetable shortening and a 24-ounce container of salad and cooking oil. As used in this report and shown in tables 5 and 6, they are (1) the farm-mill spread, (2) the mill-factory spread, (3) the factory-wholesale spread, (4) the mill-wholesale spread, (5) the wholesale-retail spread and (6) the farm-retail spread. In developing these price spreads, the farm and mill values of the crude oils in a 3-pound container of vegetable shortening and a 24-ounce container of salad and cooking oil were estimated (see appendix for methodology).

Vegetable Shortening

The Farm-Mill Spread--This spread includes costs for assembling, grading, storage, transportation, etc. Although the farm-mill spreads fluctuated widely from year to year, the spreads tended to narrow between 1947 and 1968 (table 5). This situation probably reflected more substitution between oils, the changing prices of crude oils during this period, and the strong shift in the relative importance of the major oils used in producing vegetable shortening. The wholesale price of crude soybean oil fluctuated during 1947-68--with prices as low as 8.2 cents and as high as 23.2 cents per pound, but it usually has a price advantage over other oils used. Since it is currently the major oil used in shortening its low price no doubt causes the narrowing price spreads. Crude cottonseed oil prices fluctuated from a low of 10.3 to a high of 25.9 cents per pound. This period was also marked by a striking change in the relative importance of the different oils used in shortening.

The Factory-Mill Spread--These data indicate that the spreads varied from 25 to 33 cents. Included in these spreads would be the costs for manufacturing, containers, and packaging and preparation for shipment. Factory costs (f.o.b. factory for advertised brands) were obtained from industry and the data were available only for the years 1962-65.

The Factory-Wholesale Spread--The difference between the factory cost f.o.b., and the wholesale value varied from 5 to 15 cents. This spread included the wholesalers' handling, transportation, and administrative costs. The factory-wholesale spread dropped sharply during 1964-65, reflecting a rise in factory cost in 1965 over 1964, which was accompanied by a less dramatic rise in wholesale values for the same period. The price spread of 15.3 cents in 1962 dropped 0.4 cent in 1963 and again dropped 2.5 cents from 1963 to 1964 and 7.4 cents from 1964 to 1965.

The Mill-Wholesale Spread--This spread represented the difference between the oil mill value of crude oils used in a grocery pack and the average price received by wholesalers. It showed considerable variations during 1947-68, but with spreads tending to widen. Spreads have widened because of such factors as inflation and increasing costs of labor, packaging materials, transportation, etc. This widening of the spreads was not a smooth year-to-year growth; instead, the changes were somewhat erratic, at times showing sharp increases followed by sharp decreases. For example, the mill-wholesale spread jumped from 26 cents in

1947 to 44 cents in 1949 and then dropped to 28 cents in 1950--from 40 cents in 1963 to 37 cents in 1966; and up again to 42 cents in 1967 and in 1968. The up-and-down movements reflect, in part, the changes in crude-oil prices from year to year and the substitution of less expensive oils (soybean oils) for the more expensive oils (cottonseed oils) in production, which was reflected in the oil mill value of the crude oilseed. At the same time, although the wholesale values of the 3-pound pack fluctuated, these changes were less severe than the changes reflected in the mill values of the oils used in production (table 5).

The Wholesale-Retail Spread--This spread represented the difference between the price received by wholesalers for a 3-pound pack and its retail price. Some variations occurred between years, but the short-term movements of the spreads between years seemed minor and the spreads tended to widen in recent years (table 5).

Oil Mill-Retail Price Spreads--This spread was based on retail prices for a 3-pound pack of solid vegetable shortening by major and minor brands. The size of the spreads between major and minor brands and sizes of retail outlets differed remarkably. Price spreads for major brands were as much as one-third greater than spreads for the minor brands. Such factors as strong advertising and promotion contributed to wider spreads for major brands than for minor brands. During the last quarter of 1968, the mill-retail spread based on prices for medium-sized stores in Atlanta was 59.8 cents for a major brand of shortening; it was 48.4 cents for similar minor brands. A similar relationship existed between spreads for major and minor brands in other size stores in Atlanta and other cities.

Salad and Cooking Oil

The Farm-Mill Spread--This spread represented the difference between the estimated value of crude oils used in 24 ounces of salad and cooking oil at the farm level and the equivalent value of these oils at the oil mill level. The spread varied somewhat during 1964-68; retail price data were not available prior to 1964. The spreads widened from 1964 to 1966, but for 1968 they dropped 57 percent from the 1966 level. This drop was due primarily to the drop in the price per pound of the different oils at the oil-mill level (table 6).

The Factory Mill Spread--This spread represented the difference between the mill costs of oils and the f.o.b. factory cost for advertised brands of a 24-ounce container of salad and cooking oil, was 14.2 cents for 1964 and 19.9 cents for 1965; factory cost data only available for 1964-65. This increase in the spread reflects the increase in the cost of oils used in 1965 over 1964 and also the increase in factory cost for 1965.

The Factory-Wholesale Spread--This spread represented the difference between factory costs and wholesale values: 7.3 cents in 1964 and 1.9 cents in 1965. This drop reflects a sharp increase in factory cost from 1964 to 1965. This increase in costs was considerably greater than the increase in wholesale values of oils for the same period.

The Mill-Wholesale Spread--Represented the difference between the oil mill value of crude oils used in 24 ounces of salad and cooking oil. The average

price received by wholesalers for 1964-68 tended to rise, increasing 18 percent during 1964-68,--price spreads increasing 32 percent. The spread increased each year except 1968, when there was a slight drop--0.2 cent less than in 1967. Value of crude oils at the mill level showed a similar price change pattern to that indicated by the mill-wholesale spreads (table 6).

The Wholesale-Retail Spread--The difference between the price received by wholesalers and the retail price for 24 ounces of salad and cooking oil, showed an upward trend, during 1964-68. This widening of the spreads reflects the increasing upward trend in prices at both the wholesale and retail levels but with retail prices increasing at a greater rate (table 6).

The Farm-Retail Spread--The difference between the farm value of crude oils used in 24 ounces of salad and cooking oils and the retail price of a 24-ounce unit of salad and cooking oils widened during 1964-68. This reflects, in part, the decreasing tendency in the farmers' share of the retail price of the consumer product (table 6).

Mill-Retail Price Spreads--These spreads are based on retail prices for a pint container of salad and cooking oils, for major brands only. Spreads were estimated by type of retail outlet for specified city locations, for 1968 (table 9). There was considerable variation in these spreads, between the different size stores, and between the different cities for each kind of oil, as well as between the different kinds of oils. Although price spreads are shown for soybean oil only, similar data is available for cottonseed, corn, safflower, and peanut oils.

Manufacturers' Cost

In 1947, the estimated value of crude oils and animal fats used in the production of shortening and salad and cooking oils represented slightly more than one-fourth of the manufacturer's value (receipts); in 1954 its value had dropped to slightly more than one-fifth of the manufacturer's value, but by 1963 it had increased to one-third, and it was up to 36 percent in 1967 (table 10). The remainder, ranging from 78 to 64 percent, represented the value added by manufacturers and also cost of other ingredients and other costs not ordinarily considered a part of value added by manufacturers. For example, in 1967 the estimated value of oils and animal fats used in shortening and salad and cooking oils was \$583.5 million which represented 35.8 percent of the value received for the finished products by the manufacturers in that year. The manufacturers' selling price (value of shipments), as used, represented the average value received by manufacturers, f.o.b. plant.

Table 9.—Soybean salad and cooking oil: Mill value of crude oil per pint manufacturers quarterly selling price per pint, by size, city average, and major brands; and mill-retail price spreads, for selected cities, 1968

Quarter and city	Cost of oil, crude basis 1/ average	Retail price			Mill-retail price spread			Major brands			Spread as percentage of retail price
		City	Large stores	Medium stores	City	Large stores	Medium stores	City	Large stores	Medium stores	
		<u>2/</u>	<u>3/</u>	<u>4/</u>	<u>2/</u>	<u>3/</u>	<u>4/</u>	<u>2/</u>	<u>3/</u>	<u>4/</u>	
Cents											
1st quarter:											Percent
Atlanta.....	8.3	41.9	42.9	41.6	38.8	33.6	34.6	33.3	30.5	30.2	80.7
Chicago.....	8.3	41.3	41.0	40.7	43.2	33.0	32.7	32.4	34.9	79.9	79.6
Houston.....	8.3	38.8	35.1	41.8	41.7	30.5	26.8	33.5	33.4	78.6	80.8
Los Angeles.....	8.3	36.0	33.8	37.8	43.3	27.7	25.5	29.5	35.0	76.9	80.1
Philadelphia.....	8.3	39.8	38.9	42.1	42.1	31.5	30.6	33.8	33.8	79.1	80.8
Seattle.....	8.3	41.8	40.3	43.9	43.3	33.5	32.0	35.6	35.0	80.1	80.3
											81.1
2nd quarter:											80.8
Atlanta.....	8.3	38.2	36.9	41.5	41.0	29.9	28.6	33.2	32.7	78.3	77.5
Chicago.....	8.3	41.1	41.6	38.7	41.4	32.8	33.3	30.4	33.1	79.8	80.0
Houston.....	8.3	38.9	36.2	42.6	38.6	30.6	27.9	34.3	30.3	78.7	80.5
Los Angeles.....	8.3	36.3	35.0	38.1	40.9	28.0	26.7	29.8	32.6	77.1	78.5
Philadelphia.....	8.3	39.7	38.6	39.8	43.0	31.4	30.3	31.5	34.7	76.3	79.7
Seattle.....	8.3	41.0	40.3	43.7	39.2	32.7	32.0	35.4	30.9	78.5	80.7
											81.0
3rd quarter:											81.2
Atlanta.....	8.3	37.5	35.8	39.9	41.7	29.2	27.5	31.6	33.4	77.9	79.8
Chicago.....	8.3	41.1	41.6	40.0	40.2	32.8	33.3	31.7	31.9	79.8	80.0
Houston.....	8.3	39.4	36.8	42.8	39.4	31.1	28.5	34.5	31.1	78.9	78.9
Los Angeles.....	8.3	36.3	35.2	36.3	42.4	28.0	26.9	28.0	34.1	77.1	80.4
Philadelphia.....	8.3	39.6	39.0	39.8	41.5	31.3	30.7	31.5	33.2	78.0	80.0
Seattle.....	8.3	41.4	39.9	44.2	41.6	33.1	31.6	35.9	33.3	79.0	80.7
											81.2
4th quarter:											80.0
Atlanta.....	8.3	39.6	39.1	41.4	40.3	31.3	30.8	33.1	32.0	79.0	78.8
Chicago.....	8.3	41.4	41.8	38.8	42.2	33.1	33.5	30.5	33.9	80.0	80.3
Houston.....	8.3	40.9	39.0	43.8	40.1	32.6	30.7	35.5	31.8	79.7	79.3
Los Angeles.....	8.3	37.5	36.5	37.6	41.1	29.2	28.2	29.3	32.8	77.9	79.8
Philadelphia.....	8.3	40.2	39.4	40.1	42.8	31.9	31.1	31.8	34.5	79.4	80.6
Seattle.....	8.3	41.2	39.9	43.4	42.0	32.9	31.6	35.1	33.7	79.9	80.2
											80.9

1/ Mill value of crude soybean oil in 1 pint of salad and cooking oil composed of 100 percent soybean oil. Salad and cooking oil requires 0.9625 pounds of refined soybean oil per pint of finished product or 1.011 pounds of crude oil (0.9625 times the crude-refined oil ratio of 105.0 equals 101.1 pounds and 1.011 times 8.2 cents, the value of 1 pound of crude soybean oil equals 8.3 cents).

2/ Chain stores.

3/ Large independent grocery stores.

4/ Small independent grocery stores.

Table 10.--Shortening and cooking oils: Value of shipments and value of crude oils and other ingredients and services used in production, 1947, 1954, 1963 and 1967

Year	: Value of shipments	: Crude oils and animal fats: Value 2/ 1/	: Percentage of value of shipments	: Other ingredients and services: Value 3/ manufacturer's value	: Percentage of manufacturer's value of shipments
	<u>Mil. dol.</u>	<u>Mil. dol.</u>	<u>Percent</u>	<u>Mil. dol.</u>	<u>Percent</u>
	1,099.0	320.3	29.1	778.7	70.9
1947...					
1954...	1,154.0	257.5	22.3	896.7	77.7
1963...	1,324.0	446.6	33.7	877.4	66.3
1967...	1,629.0	583.5	35.8	1,045.5	64.2
:					

1/ Bureau of the Census. Manufacturer's net selling value f.o.b. factory after discounts and allowances and excluding freight charges and excise taxes.

2/ Estimated. Represents quantities of oils used in the products times wholesale price.

3/ Difference between manufacturer's value of shipments and the estimated value of crude oils and animal fats used in shortening and salad and cooking oils.

APPENDIX: METHODOLOGY

The methodology used for determining price spreads at various levels for vegetable shortening and salad and cooking oils (shortening) (appendix tables 11-15) follows:

- Estimate the value of crude oil used in shortenings at the mill;
- Ascertain the proportions of soybean, cottonseed, and other vegetable oils used in these products and adjust each to comparable crude-oil ratios;
- Apply oil-content ratios to crude-oil wholesale values for a 3-pound shortening pack or a 24-ounce oil container;
- Adjust these values to comparable farm values, by determining the mill and country shipper price spreads and deducting them from the mill value of the oils;
- Apply price spread ratios (or the mill and shippers' shares of the farm-mill-processing margin) to estimate the mill price spread for the oils used in shortenings. Oil value estimates for the country shipping point were supplied by subtracting the mill spread;
- Apply the shipper's price spread ratio (or the shipper's share of the farm-mill processing margin) to the oil value at the shipping point. This determines the shipper's spread;
- Deduct the shipper's spread from the oil values at the country shipping point to obtain the value of oils at the farm level.

Mechanics of the procedure can be further studied through the following example taken from appendix tables 13, 14, and 15.

In 1968, the mill's share and the shipper's share of the farm-mill margin for soybeans were estimated at 4.4 and 4.6 percent (appendix table 13). For the same year, the mill value of crude soybean oil used in a 3-pound pack of shortening was estimated at 21.2 cents. The mill spread of 4.4 percent of 21.2 cents, amounted to 0.93 cents, indicating an oil value of 20.3 cents (21.24 cents less 0.93 cent) at the country shipper level. The country shipper spread, or 4.6 percent of 20.3, was 0.9 cent, leaving an estimated farm value of 19.4 cents (20.3 cents less 0.9 cent) for crude soybean oil used in a 3-pound pack of shortening. The gin and mill spread of 3.0 cents and the farm value of 4.3 cents for cottonseed and other oils were arrived at in similar fashion (appendix table 15).

Spreads and farm values for soybean, cottonseed, and other oils were combined. The resulting estimates indicated that the 1968 farm value of oil in a 3-pound grocery pack of vegetable shortening was 23.7 cents, estimated on the basis of vegetable shortening containing 100 percent refined oils by weight.

Price spread ratios were determined separately for crude soybean and cottonseed oil and for country shipper and oil mill services. No established price series for cottonseed at gins or country points exists so separate country shipper's (gin) and oil mill spreads for cottonseed could not be estimated.

Table 11.--Conversion of refined oils used in vegetable shortening to crude basis, by type of oil used,
1964-68

Year	Soybean oil			Cottonseed and other oils			Total adjusted oil content per unit of vegetable shortening
	Proportion of oils 1/	Crude-refined ratio 2/	Adjusted share 3/	Proportion of oils 1/	Crude-refined ratio 2/	Adjusted share 3/	
							:
							Percent
1964..:	76.4	103.4	79.0	23.6	105.3	24.9	103.9
1965..:	76.5	103.9	79.5	23.3	108.2	25.2	104.7
1966..:	78.5	104.1	81.7	21.5	106.2	22.8	104.5
1967..:	80.6	104.1	83.9	19.4	106.2	20.6	104.5
1968..:	82.3	105.0	86.4	17.7	105.6	18.7	105.1

1/ Proportion of the different oils used, refined basis, in vegetable shortening.

2/ Crude-refined oil ratio estimated by relating the quantity of crude oil used to the quantity of refined oil produced. Source: Bureau of the Census.

3/ Refined oil content converted to crude oil basis. Proportion of oils times crude-refined ratios gives adjusted share.

Table 12.--Conversion of refined oils used in salad and cooking oils to crude oil basis, by type of oil used, 1964-68

Type of oil and year	Proportion of oils <u>1/</u>	Crude-refined ratio <u>2/</u>	Adjusted share <u>3/</u>
<u>Percent</u>			
Soybean:			
1964.....	51.1	103.4	76.28
1965.....	52.0	103.9	78.01
1966.....	56.9	104.1	85.37
1967.....	59.5	104.1	89.27
1968.....	64.7	105.0	98.08
Cottonseed:			
1964.....	35.0	105.3	53.21
1965.....	35.2	108.2	54.99
1966.....	29.1	106.2	44.62
1967.....	24.1	106.2	36.95
1968.....	19.5	105.6	29.73
Corn:			
1964.....	10.8	106.8	16.65
1965.....	10.1	107.6	15.69
1966.....	8.8	108.4	13.77
1967.....	9.3	108.1	14.51
1968.....	9.1	108.0	14.13
Peanut:			
1964.....	2.2	104.3	3.31
1965.....	2.3	103.7	3.44
1966.....	4.7	103.7	7.04
1967.....	5.4	106.0	8.26
1968.....	5.9	104.2	8.88
Safflower:			
1964.....	0.9	101.9	1.32
1965.....	0.4	101.3	0.59
1966.....	0.5	101.6	0.73
1967.....	1.7	102.0	2.50
1968.....	0.8	104.6	1.21

1/ Proportion of the different oils used in producing salad and cooking oils.

2/ Crude-refined oil ratio estimated by relating the quantity of crude oil used to the quantity of refined oil produced. Source: Bureau of the Census.

3/ Refined oil content converted to crude oil basis.

Table 13.--Farm and country shipping point prices of soybeans per bushel, mill sales value of equivalent quantity of products, and country shipper and mill margins, 1964-68

Crop years	Soybeans		Value of products at mill per bu. <u>3/</u>	Percentage margins		
	Farm price per bu. <u>1/</u>	Country shipper's price per bu. <u>2/</u>		Country shippers <u>4/</u>	Mill <u>5/</u>	
:----- <u>Dollars</u> -----						
----- <u>Percent</u> -----						
1964.....	2.51	2.59	2.46	3.1	1.9	
1965.....	2.62	2.81	2.88	6.8	2.4	
1966.....	2.54	2.91	3.17	12.7	8.2	
1967.....	2.77	2.86	3.01	3.1	5.0	
1968.....	2.49	2.61	2.73	4.6	4.4	
:						

1/ U.S. average prices received by farmer. 2/ No. 1 yellow-Illinois country shipping points. 3/ Value of crude oil and meal per ton of soybeans processed. Estimates obtained from Fats and Oils Section, Economic and Statistical Analysis Div., ERS. 4/ Estimated by dividing the difference between the farm price of soybeans and the country shipper's price by the country shipper's price. 5/ Estimated by dividing the difference between the country shipper's price and the value of products at the mill by the value of products at the mill.

Table 14.--Cottonseed prices and combined percentage margin of country shipper and mills, 1964-68

Crop year	Prices per ton received by farmers <u>1/</u>	Value per ton of products at mill <u>2/</u>	Percentage margin			
			gin and mill <u>3/</u>	:		
:----- <u>Dollars</u> -----						
----- <u>Percent</u> -----						
1964.....	50.70	72.60	30.2			
1965.....	47.10	76.97	38.8			
1966.....	46.70	86.10	45.8			
1967.....	65.90	97.74	32.6			
1968.....	55.20	93.76	41.4			
:						

1/ U.S. average prices. 2/ Value of crude oil, meal, linters, and hulls per ton of cottonseed processed. Estimates obtained from Fats and Oils Section, Economic and Statistical Analysis Division, ERS. 3/ Estimated by dividing the difference between the farm price per ton of cottonseed and the value of products at the mill by the value of products at the mill.

Table 15.—Value of soybean and cottonseed, and other oils equivalents per 3-pound grocery pack of shortening at farm, country shipper, and oil mills, and price spreads, 1964-68

Farm value		Country shipper value		Mill value	
Crop year	Cottonseed, corn, and oil	Total oil	Soybean oil	Cottonseed, corn, and oil	Soybean oil
1964.....	20.74	5.36	26.10	21.40	21.40
1965.....	24.29	6.42	30.71	26.06	26.06
1966.....	22.99	5.30	28.29	26.33	26.33
1967.....	22.23	4.91	27.14	22.94	22.94
1968.....	19.38	4.33	23.71	20.31	20.31
				Cents	
				1/	
				2/	
				3/	

Country shipper spread		Mill spread		Farm-to-mill spread	
Cottonseed, corn, and oil 2/	Total oil 3/	Soybean oil 2/	Cottonseed, corn, and oil 3/	Soybean oil 2/	Cottonseed, corn, and oil 3/
1964.....	0.66	0.66	0.41	2.32	2.73
1965.....	1.77	1.77	.64	2.43	3.07
1966.....	3.34	3.34	2.35	4.48	6.83
1967.....	.71	.71	1.21	2.38	3.59
1968.....	.93	.93	.93	3.02	3.95
				Cents	
				1/	
				2/	
				3/	

1/ Included in mill margins.

2/ Estimates based on columns 4 and 5 of table 13.

3/ Estimates based on columns 3 table 14.

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